

DECLARATION

The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

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Date of Signature

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1 REGULATED DASHPOT WITH SHOCK-ABSORPTION FORCE CONTROLS

2 > Background of The INVENTION

3 The present invention concerns a regulated dashpot with shock-
4 absorption force controls, especially intended for motor
5 vehicles, as recited in the preamble to Claim 1.

6 Regulated hydraulic dashpots with flow-regulating system that
7 shift back and forth between compression and decompression phases
8 in operation are known. Dashpots of this genus are described in
9 German 3 803 838 C2 for instance.

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11 There is a drawback to such dashpots in that their design permits
12 them to shift only suddenly between the hard and soft phases,
13 limiting the range of control. The comfortability of the ride can
14 be increased only to a limited extent.

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16 The object of the present invention is accordingly a dashpot of
17 the aforesaid genus that can shift continuously between the hard
18 and soft phases, whereby the valve-adjustment intervals can be
19 varied at intervals that are not unnecessarily short or even
20 unattainable.

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22 This object is attained by the characteristics recited in Claim
23 1. Advantageous and advanced embodiments are addressed in Claims
24 2 through 8.

25 SUMMARY OF THE INVENTION

26 The present invention has many advantages. A continuous
27 transition between hard and soft phases can be obtained by simple

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1 The figures illustrate hydraulic circuitry specific to various
2 dashpots. Each dashpot includes a piston 3 mounted on the end of
3 a piston rod 2 and traveling back and forth inside a cylinder 1.
4 A reservoir 4 contains a compressed gas that compensates for the
5 volume of hydraulic fluid displaced by piston 3. Reservoir 4 can
6 be integrated into the dashpot.

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8 Figure 1 illustrates the hydraulic circuitry for a dashpot in
9 accordance with the present invention. The dashpot includes two
10 hydraulically parallel regulating valves 5 and 6. Hydraulically
11 paralleling both regulating valves 5 and 6 is a very narrowly
12 constricted bypass valve 7, which can alternatively be integrated
13 into one or both regulating valves. Bypass valve 7 provides a
14 minimal passage for the hydraulic fluid and accordingly prevents
15 the dashpot from being entirely blocked while regulating valves 5
16 and 6 are closed. When closed, regulating valves 5 and 6 provide
17 continuous regulation of the two phases and, when closed, allow
18 the fluid to flow. Regulating valve 5 regulates the flow while
19 piston 3 is traveling in the compression direction and regulating
20 valve 6 regulates it while the piston is traveling in the
21 decompression direction. The rate of flow depends on the one hand
22 on the difference between the pressure in an upper chamber 8 and
23 that in a lower chamber 9, the two chambers being separated by
24 piston 3, and on the other hand on the cross-section of the
25 passage through regulating valves 5 and 6 as dictated by flow
26 controls like those known from German Patent 10 040 518.

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1 decompression phases. In addition to bypass valve 7, bypass
2 valves 19 and 20 can be introduced paralleling spring-loaded
3 checkvalves 12 and 13.

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5 This embodiment ensures constantly reliable driving performance
6 even when the electricity or electronics fail. In such an event,
7 regulating valves 5 and 6 will substantially close, and continued
8 operation of the dashpot will be ensured by the mechanical action
9 of the spring-loaded checkvalves 16 and 17 in valve assembly 18
10 at a hard performance curve, preferably within piston 3, that is.

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12 The embodiment illustrated in Figure 5 lacks the regulated
13 spring-loaded checkvalves 12 and 13 employed in the embodiment
14 illustrated in Figure 4. This embodiment is an advanced version
15 of the regulable dashpot illustrated in Figure 1, employing a
16 parallel valve assembly 18 like that in the version illustrated
17 in Figure 4. The bypass valve can also be eliminated.

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19 Figure 6 illustrates an alternative to the embodiment illustrated
20 in Figure 5. Paralleling a valve assembly 18 that comprises
21 unregulated spring-loaded checkvalves 16 and 17 with their hard
22 performance curve are two similar spring-loaded checkvalves 12
23 and 13 with a soft performance curve. Checkvalves 12 and 13 can
24 be brought into play by way of associated hydraulic switches 21
25 and 22, allowing a soft performance curve to be introduced while
26 piston 3 is traveling in either the compression or the
27 decompression direction. Paralleling these are two parallel one-

1 way checkvalves 23 and 24 with a soft performance curve that can
2 be actuated and regulated by a regulating valve 25. This
3 circuitry again allows the shock-absorption performance curves to
4 be established anywhere between hard and soft independently of
5 each other as desired with the piston traveling in either
6 direction.

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8 Circuitry similar to that illustrated in Figure 6 can be attained
9 as illustrated in Figure 7. The soft checkvalves 12 and 13 in
10 this embodiment are provided with a two-to-three way valve 26
11 instead of two individual switching valves.

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13 Figure 8 illustrates another alternative embodiment. A valve
14 assembly 27 comprises two spring-loaded checkvalves 28 and 29,
15 each permitting the flow in a direction opposite that of the
16 other. Checkvalves 28 and 29 have a soft performance curve and
17 are alternately controlled by a two-to-three way valve 30. A
18 flow-regulating valve 31 continuously opens or closes a parallel
19 hydraulics line 32. A constricted bypass valve 33 ensures minimal
20 unimpeded flow.

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22 Figure 9 illustrates an advanced version of the of the embodiment
23 illustrated in Figure 8. Upstream of flow-regulating valve 31 is
24 a valve assembly 34 comprising two spring-loaded opposed-flow
25 checkvalves 35 and 36. Checkvalves 35 and 36 also have a soft
26 performance curve, although this curve can be varied between hard
27 and soft. Bypass valve 33, which, like the one illustrated in

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Figure 11 illustrates another advanced version of the embodiment illustrated in Figure 8. It includes a valve assembly 27 comprising spring-loaded opposed flow checkvalves 28 and 29 with a soft performance curve, their direction of flow being reversed by a two-to-three way valve 30. The flow-regulating valve 31 in this embodiment, however, parallels valve 30, constantly maintaining the valve assembly 27 comprising checkvalves 28 and 29 in series with the latter. This embodiment also includes a constricted bypass valve 33 that ensures minimal flow.

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List of parts

- 1
- 2 1. cylinder
- 3 2. piston rod
- 4 3. piston
- 5 4. reservoir
- 6 5. regulating valve
- 7 6. regulating valve
- 8 7. constricted bypass valve
- 9 8. upper cylinder chamber
- 10 9. lower cylinder chamber
- 11 10. checkvalve
- 12 11. checkvalve
- 13 12. checkvalve
- 14 13. checkvalve
- 15 14. compression spring
- 16 15. compression spring
- 17 16. checkvalve
- 18 17. checkvalve
- 19 18. valve assembly
- 20 19. constricted bypass
- 21 20. constricted bypass
- 22 21. hydraulic switch
- 23 22. hydraulic switch
- 24 23. checkvalve
- 25 24. checkvalve

- 1 25. flow-regulating valve
2 26. two-to-three way valve
3 27. valve assembly
4 28. checkvalve
5 29. checkvalve
6 30. two-to-three way valve
7 31. flow-regulating valve
8 32. hydraulics line
9 33. constricted bypass valve
10 34. valve assembly
11 35. checkvalve
12 36. checkvalve
13 37. valve assembly
14 38. checkvalve
15 39. checkvalve
16 40. flow-regulating assembly
17 41. flow-regulating block
18 42. valve assembly
19 43. checkvalve
20 44. checkvalve
21 45. intermural space
22 46. bottom valve
23
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Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

CONTROLABLE VIBRATION DAMPER WITH

POWER DAMPING CONTROL

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigelegt ist.

☐ am _____ unter der

Anmeldungsseriennummer _____

eingereicht wurde und am _____
abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben; das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as

Application Serial No: _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications

Priorität beansprucht

Priority Claimed

100 62 999.7

Germany

16/12/2000

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☒ Yes
Ja

☐ No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☐ Yes
Ja

☐ No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☐ Yes
Ja

☐ No
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 112 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

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(patentiert, anhängig,
aufgegeben)

(Status)
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

